

# How Team Cohesion Leads to Attitude Change in the Context of ERP Learning

*Completed Research Paper*

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## Abstract

*Universities and corporate training programs have realized the importance of enterprise resource planning (ERP) systems in the business world and have incorporated such systems into their curricula and training. Although there is a rich body of literature on ERP, extant research remains relatively scant in examining team-based ERP learning. Drawing upon attitude change literature and expectation-confirmation theory, this study presents an Attitude Change Model of Team-Based ERP Learning. In particular, this study focuses on how team cohesion influences satisfaction and attitude change in ERP learning. The results of structural equation modeling support all but one hypothesis. The study concludes with discussions and implications for researchers, educators, and practitioners.*

**Keywords:** Enterprise Resource Planning (ERP), Team Cohesion, Attitude Change

## Introduction

Since the successful implementation of enterprise resource planning (ERP) systems has dramatically increased operational efficiency and business performance, many large- and medium-sized firms have adopted ERP systems (Liang et al. 2007). Their implementation accounts for 30 percent of all major organizational changes (Herold et al. 2007; Morris and Venkatesh 2010). However, many ERP projects have not been successful and have even led to financial problems (Xue et al. 2005), with 40 to 60 percent of ERP implementations classified as “failures” (Langenwaller 2000). There are many reasons for failure of ERP systems such as poor project management and implementation (Xue et al. 2005); additionally user training is one of key factors in any successful IT implementation (Compeau et al. 1995).

Universities and corporate training programs have realized the importance of ERP systems in the business world and have incorporated such systems (e.g., SAP or Oracle) into their curricula and training (Antonucci et al. 2004). As ERP system implementations generally involve a substantial redesign of business processes (Robey et al. 2002), the use of such systems as a learning environment provides an excellent opportunity to allow students to gain insight into the integration and functionality of business and IT (Cronan et al. 2012).

While there has been a rich body of ERP research on specific topics such as adoption and implementation (Holland and Light 1999; Markus and Tanis 2000), assimilation (Liang et al. 2007), job characteristics and satisfaction (Morris and Venkatesh 2010), extant research remains relatively scant in examining team-based ERP learning. Related to the general concept of learning, user training is considered a foundation in any successful IT implementation (Compeau et al. 1995). Since user satisfaction and attitude are considered significant factors in IS success and adoption (e.g., DeLone and McLean 1992; McKinney et al. 2002; Bhattacharjee and Sanford 2006), learning research may be significantly informed from learner satisfaction and attitude change. Additionally, a change in the attitude of a user toward an ERP system can be influenced by learning and training (e.g., Angst and Agarwal 2009).

Given the importance of ERP learning, this study poses the following research question: *How does team cohesion influence satisfaction and attitude change?* Drawing upon expectation-confirmation theory (ECT) and the attitude literature, the purpose of current study is to present an *Attitude Change Model of Team-Based ERP Learning*. This study also presents an *Attitude Formation Model* as a post hoc analysis to show the difference between it and the *Attitude Change Model*.

The organization of current study is as follows. In the next section, the ECT and attitude literature are reviewed to establish the theoretical foundations for examining attitude change through ERP learning, followed by a presentation of the research model and hypotheses. In turn, we describe the research method and data analyses. This study concludes with a discussion of results and implications for research, practice, and education as well as limitations and future research directions.

## Theoretical Foundation

In this section, we briefly review the expectation-confirmation theory and the attitude literature as theoretical foundations.

### ***Expectation-confirmation Theory***

The ECT consists of four main constructs: expectations, perceived performance, confirmation, and satisfaction. The ECT posits that a consumer's expectations and perceived performance affect positive or negative disconfirmation. If a service outperforms expectations (positive disconfirmation) post-purchase satisfaction will be increased. If a service falls short of expectations (negative disconfirmation), the consumer is likely to be dissatisfied. Lastly, satisfied consumers form an intention to repurchase, while dissatisfied users would be less likely to buy the service again (Oliver 1980; Spreng et al. 1996).

The ECT has been extensively employed in consumer behavior research to understand consumer satisfaction and post-purchase intentions. IS researchers have applied the theory to IT usage (Bhattacharjee 2001; Bhattacharjee 2004; Venkatesh and Goyal 2010) and web consumer satisfaction (McKinney et al. 2002). However, it has rarely been used in a team-based learning and training context.

## Attitudes in IS Research

It is worthwhile to briefly review the three theoretical streams from which much research on IT adoption is based: (1) the belief focus, (2) the IT-specific belief focus, and (3) the influence (or persuasion) focus. The belief focus stream includes the theory of reasoned action (TRA [Fishbein and Ajzen 1975]) and the theory of planned behavior (TPB [Ajzen 1991]) while the IT-specific belief focus contains the technology acceptance model (TAM [Davis et al. 1989]) and the unified theory of acceptance and use of technology (UTAUT [Venkatesh et al. 2003]). These two theories have been dominant in individual IT adoption research and posit that behavioral intention/technology adoption is based on individuals' beliefs about the results of adoption (Bhattacharjee and Sanford 2006). The influence focus has recently received attention from IS researchers (e.g., Bhattacharjee and Sanford 2006; Sussman and Siegel 2003; Angst and Agarwal 2009). The elaboration likelihood model (ELM [Petty and Cacioppo 1986]) and the heuristic-systematic model (HSM [Chaiken et al. 1981]) are in this research stream. In particular, these theories emphasize external influence and information processing of consumer/users in attitude formation and change.

The aforementioned research streams have distinct perspectives in examining attitudes. TAM- and UTAUT-based IT research has generally omitted attitudes as a mediator "because of a partial mediation of the impact of beliefs on intention by attitudes, a weak direct link between perceived usefulness and attitude, and a strong direct link between perceived usefulness and intention" (Venkatesh 2000, p. 343). Conversely, TRA and TPB claim that attitudes completely mediate the relationships between beliefs and intentions, and thus TRA/TPB based IS research includes attitudes in involuntary contexts. As Angst and Agarwal (2009) pointed out, "with few exceptions, prior research has implicitly suggested that the attitudes of potential adopters of technology are relatively immutable" (p. 341). In other words, compared to TRA/TPB which emphasizes identifying salient beliefs, persuasion theories such as ELM focuses on role of external influence and information processing in attitude change regarding persistence and resistance. Table 1 provides a summary of three theoretical streams. This study is in line with influence focus stream and examines the role of team cohesion in learners' attitude change. In the following section, we provide a research model and hypotheses.

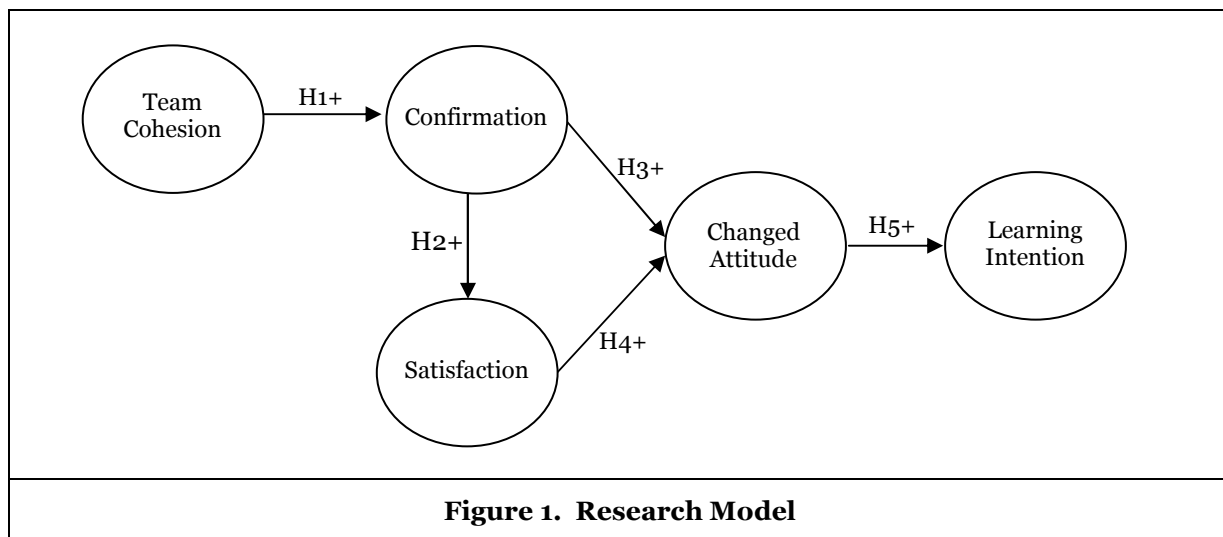
**Table 1. Summary of Research Streams**

Research Stream	Theory	Application in IS	Perspective in Examining Attitude
Belief Focus	TRA TPB	<ul style="list-style-type: none"> <li>• Anti-spyware software adoption (Dinev and Hu 2007)</li> <li>• Knowledge sharing in organizations (Bock et al. 2005)</li> <li>• eCommerce (Pavlou and Fygenson 2006).</li> </ul>	<ul style="list-style-type: none"> <li>• Complete mediation between beliefs and intentions</li> <li>• Relatively immutable</li> </ul>
IT Specific Belief Focus	TAM UTAUT	<ul style="list-style-type: none"> <li>• Mobile Internet use: UTAUT 2 (Venkatesh et al. 2012)</li> <li>• IT use: TAM 3 (Venkatesh and Bala 2008)</li> </ul>	<ul style="list-style-type: none"> <li>• Weak mediation between perceived usefulness and intentions</li> <li>• Attitude can be omitted in the model</li> </ul>
Influence Focus	ELM HSM	<ul style="list-style-type: none"> <li>• Private Information disclosure (Bansal et al. 2008)</li> <li>• Information adoption (Sussman and Siegal 2003)</li> <li>• Electronic health record use (Angst and Agarwal 2009)</li> <li>• IT use (Bhattacharjee and Sanford 2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Core dependent variable</li> <li>• Attitude can be changed</li> </ul>

## Research Model and Hypotheses

We rely on the ECT to examine the role of team cohesion in satisfaction and attitude change of the ERP simulation game, a popular ERP training tool. In addition, this study includes behavioral intention to learn ERP systems for the sake of completeness as presented in Figure 1.

We used the SAP simulation game developed at HEC Montreal (Léger 2006; Léger et al. 2007; Léger et al. 2011). This simulation game employs a real-time simulation approach; the simulator, ERPSim, reacts in real time to individual team decision making for multiple teams (Cronan et al. 2012). As the most widely used ERP simulation game, ERPSim is a suitable tool for examining the role of team cohesion and attitude on the extent of student mastery of ERP contents. There are several variations of the ERP simulation game, such as the distribution game, the manufacturing game, and the logistics game. For this study, we used the basic distribution game, *Water Bottle Game*, because participants were students enrolled in the introductory-level IT class and thus most of them had little previous knowledge of ERP systems or ERP simulation games. Second, teams were not pre-organized and thus the team members were not familiar with each other.



Perceived cohesion is defined as “an individual’s sense of belonging to a particular group and his/her feelings of morale associated with membership in the group” (Bollen and Hoyle 1990, p. 482). Without a sense of belonging, group members would not desire a relationship with their members and without a positive feeling of morale, the motivation to accomplish group goals and objectives would be reduced (Bollen and Hoyle 1990; Chin et al. 1999). In a meta-analysis, Beal et al. (2003) found stronger correlations between cohesion and performance when performance was defined as behavior (as opposed to outcome) and when it was measured with efficiency (as opposed to effectiveness).

In team-based ERP learning, team cohesion reflects a learner’s cognitive and affective appraisal of his/her relationship to the team during the ERP simulation game (Chin et al. 1996). When cohesion is strong, the team member is motivated to perform tasks well and is better able to coordinate/collaborate activities for successful results (Beal et al. 2003; Davis 1969). In a cohesive team, members would effectively assign their roles, strive to excel in their roles, and actively communicate to accomplish a better performance than the other competing teams (e.g., maximizing profit). In the long run, team members will feel that they learn more about ERP systems. In addition, confirmation can be positive or negative depending on whether the perceived team cohesion is above or below initial expectations before participating in the ERP simulation game. Finally, the team members in a cohesive team would perceive more congruity between their expectations of the ERP simulation game and perceived learning outcomes. This leads us to the following hypothesis:

*H1: Team cohesion positively influences confirmation of learning the ERP simulation game.*

Confirmation is defined as a learner's perception of the congruence between the expectations of the ERP simulation game use and perceived learning performance (Bhattacharjee 2001). The dissonance between a learner's original expectations of the ERP simulation game and his/her perceived learning performance is captured in the confirmation construct and it is also viewed as a deviation from the initial expectations (Bhattacharjee and Premkumar 2004). Most empirical ECT research directly linked confirmation to satisfaction (e.g., Bhattacharjee 2001; Bhattacharjee and Premkumar 2004; Patterson et al. 1997; Spreng et al. 1996). We also expect that a learner's confirmation would increase satisfaction, leading to the following hypothesis:

*H2: Confirmation of learning the ERP simulation game positively influences satisfaction of learning the ERP simulation game.*

Confirming the expectations of the ERP simulation game suggests that learners are able to understand the potential benefits of learning about ERP systems (e.g., gaining IT knowledge and understanding complex business process). According to the TRA and the TPB, salient beliefs directly relate to attitudes. Likewise, confirmation (i.e., a belief) would increase attitude change. In other words, people who highly confirmed the ERP simulation game would have a more positive post-attitude than pre-attitude. However, people who do not experience what they expected are likely to have a negative attitude toward the game compared to their pre-attitude. Hence, we hypothesize:

*H3: Confirmation of learning the ERP simulation game positively influences changed attitude toward learning the ERP simulation game.*

Satisfaction is defined as a learner's affect with feelings about the ERP simulation game (Bhattacharjee 2001). In the context of IT usage, Bhattacharjee and Premkumar (2004) found that users' satisfaction is positively associated with attitude toward IT usage. In a similar vein, we expect that learners' high satisfaction of learning the ERP simulation game would result in increased feelings toward it. Thus, we have the following hypothesis:

*H4: Satisfaction of learning the ERP simulation game positively influences changed attitude toward learning the ERP simulation game.*

Changed attitude refers to learners' changed (increased or decreased) appraisal from the experience of the ERP simulation. Since the purpose of the ERP simulation game is to educate learners and trainees about ERP systems in terms of ERP functionalities and business processes, learners who increased their appraisal toward the ERP simulation would be more willing to learn about ERP systems.

*H5: Changed attitude toward learning the ERP simulation game positively influences intention to learn ERP systems.*

## Method and Data Analysis

### Measures

To increase construct validity, we used previously validated measurement scales. Bollen and Hoyle (1990) created the six-item Perceived Cohesion Scale (PCS) to measure perceived cohesion in groups. Later, Chin et al. (1999) adapted the PCS scales for the small-group arena. Since teams for the ERP simulation game consist of 2-5 members, team cohesion was adapted from Chin et al. (1999). Table 2 reports measures, scale anchors, and sources.

## Subjects and Procedure

The subjects of this study were undergraduate students at a large Midwestern public university in the United States, who were registered in an Introduction to Information Technology Management class. The introductory class included an ERP simulation game and the game was the first teamwork activity in the course. The method of this study included three phases. In phase 1, students watched an introductory ERPsim video and then were asked to fill out a pre-test survey including attitude, involvement, and other demographic questions. In phase 2, students were assigned to one team, which consisted of 2-5 members. The ERP instructor, one of the authors, gave the students instructions on ERPsim in terms of login, team objectives, and the SAP modules. In phase 3, after the ERPsim game concluded, students were asked to fill out a post-test survey.

Table 2. Measurement Items	
Team cohesion (Adapted from Chin et al. 1996) Seven-point scales anchored with “strongly disagree” and “strongly agree”	
TCOH1	I feel that I belong to my team.
TCOH2	I am happy to be part of my team.
TCOH3	I see myself as part of my team.
TCOH4	My team is one of the best anywhere.
TCOH5	I feel that I am a member of my team.
TCOH6	I am content to be a part of my team.
Confirmation of learning the simulation game (Adapted from Bhattacharjee 2001) Seven-point scales anchored with “strongly disagree” and “strongly agree”	
CON1	Learning via the SAP simulation game was better than what I had expected.
CON2	Overall, most of my learning expectations regarding the learning SAP simulation game were verified.
CON3	Overall, most of my learning expectations regarding the learning SAP simulation game were confirmed.
Satisfaction of learning the simulation game (Adapted from Bhattacharjee 2001) Seven-point semantic scales	
	How do you feel about your overall experience with the SAP simulation game:
SAT1	very dissatisfied/very satisfied
SAT2	very displeased/very pleased
SAT3	very frustrated/very contented
Attitude toward learning the simulation game (Adapted from Ajzen 1991) Seven-point semantic scales	
	For me, learning the SAP simulation game is
ATT1	a bad idea/a good idea
ATT2	foolish/beneficial
ATT3	undesirable/desirable
Intention to learn ERP systems (Adapted from Davis et al. 1989) Seven-point scales anchored with “strongly disagree” and “strongly agree”	
INT1	I intend to learn about ERP systems.
INT 2	I predict that I will learn about ERP systems.
INT 3	I am willing to learn about ERP systems.
Uncertainty Avoidance (Adapted from Srite and Karahanna 2006) ( <u>Marker Variable</u> ) Seven-point scales anchored with “strongly disagree” and “strongly agree”	
UA1	Rules and regulations are important because they inform workers as to what the organization expects of them.
UA2	Order and structure are very important in a work environment.
UA3	It is important to have job requirements and instructions spelled out in detail so that people always know what they are expected to do.

Note: Since we used the SAP simulation game, we used the term SAP rather than ERP when indicating the simulation game.

A total of 289 students from 12 discussion sections participated in the study. 64 students completed the pre-test survey but did not show up to play the actual game, and these responses had to be discarded as were 6 responses who were a single member in their teams. The sample consisted of 148 males (67.6%) and 71 females (32.4%). A very large proportion (94.5%) of the subjects was between 18 and 24 years of age. The class standing of participants was freshmen (36.1%), sophomore (26.5%), junior (28.8%), and senior (8.7%).

We randomly assigned four to five students to each team, however some of them were not present for the course activity. Thus, we examined team size bias as well as class assignment bias using an involvement construct consisting of “*Learning about ERP systems is very important to me,*” “*Learning about ERP systems matters a lot to me,*” and “*In general, I have strong interest in learning about ERP systems.*” As shown in Tables 3 and 4, the means of involvement are not significantly different across 12 discussion sections and across team sizes, confirming absence of any bias regarding class assignment and team size.

<b>Table 3. Results of Class Assignment Bias Check</b>						
Class #	# of Teams	# of Participants	Pre-Involvement		Post-Involvement	
			Mean	Std. Dev.	Mean	Std. Dev.
1	6	25	3.23	1.39	4.08	1.56
2	4	14	3.52	1.55	4.19	1.52
3	4	12	3.75	1.36	5.00	1.26
4	5	15	3.93	1.28	4.40	1.80
5	5	15	3.93	1.37	4.11	1.92
6	7	21	3.16	1.31	4.48	1.44
7	7	26	3.90	1.32	5.22	1.32
8	7	23	3.29	1.22	3.99	1.54
9	4	12	3.50	1.73	3.81	1.77
10	4	13	3.79	1.45	3.95	1.70
11	7	24	3.68	1.49	4.28	1.68
12	6	19	3.98	1.63	4.75	1.47
Total	66	219	3.61	1.41	4.38	1.59
ANOVA		F			1.458	
		Sig			.150	

<b>Table 4. Results of Team Size Bias Check</b>						
Team Size	# of Teams	# of Participants	Pre-Involvement		Post-Involvement	
			Mean	Std. Dev.	Mean	Std. Dev.
2	9	18	3.65	1.06	4.26	1.61
3	30	90	3.80	1.50	4.47	1.63
4	24	96	3.55	1.40	4.39	1.58
5	3	15	2.87	1.08	3.96	1.45
ANOVA		F			.483	
		Sig			.694	

## Measurement Model

Construct validation and hypothesis testing with structural equation modeling (SEM) were conducted using AMOS 21.0. Following Anderson and Gerbing (1988), we used a two-step approach: confirmatory factor analysis (CFA) to assess the measurement model and structural modeling to test the hypotheses. A 6-factor measurement model, including analysis of convergent and discriminant validity, was assessed to examine the measurement quality of constructs.

Various overall fit indices of the measurement model suggested a good fit, as most indices were above or at the recommended thresholds (See table 7). We also assessed convergent validity, reliability, and discriminant validity. Convergent validity was examined by comparing the standardized factor loadings of each item with the recommended minimum value of .60 (Chin et al. 1997). The lowest item loading is .66, adequately demonstrating convergent validity. Cut-off values of Cronbach's alpha, composite reliability, and average variance extracted (AVE) are .70, .70, and .50, respectively. We found satisfactory results for reliability. Discriminant validity was assessed by comparing the square root of AVE for each construct with the correlations between the constructs (Gefen and Straub 2005). As shown in Table 5, the square root of AVE of the each construct is larger than its correlations, suggesting discriminant validity of constructs. Discriminant validity was also shown in CFA via a  $\chi^2$  difference test between a constrained model that sets the correlation between two latent variables (e.g., confirmation and satisfaction in this study) to 1 and an unconstrained model that frees the correlation (Sears and Grover 1998). We found significant  $\chi^2$  difference ( $p < .001$ ), affirming discriminant validity.

**Table 5. Results of CFA: Correlation and Reliability of Latent Constructs**

	Mean	Std. Dev	Alpha	CR	AVE	Range of Factor Loading	Correlation				
							TCHO	CON	SAT	CHATT	INT
TCOH	5.37	1.33	.95	.94	.72	.66-.91	<b>.85</b>				
CON	4.58	1.53	.91	.91	.78	.87-.89	.67	<b>.88</b>			
SAT	4.71	1.50	.95	.96	.88	.90-.96	.49	.80	<b>.94</b>		
CHATT*	-.08	1.45	.82	.83	.61	.77-.81	.32	.52	.61	<b>.92</b>	
INT	4.62	1.47	.90	.90	.76	.84-.92	.51	.76	.62	.43	<b>.87</b>

\*Changed Attitude (CHATT) = Difference between post-attitude and pre-attitude

Alpha: Cronbach's alpha, CR: Composite reliability, AVE: Average variance extracted

**Square-root of AVE values** represented along the diagonal

## Common Method Bias

We assessed common method bias (CMB) with three tests. First, Harman's single-factor test was performed. The result shows that a single factor did not come out from the unrotated solution. Second, CFA was conducted to test a single factor model with all 20 indicators (Kearns and Sabherwal 2007). The model exhibited a very poor fit with  $\chi^2(135) = 1486.899$ ,  $\chi^2/df = 11.014$ , NFI = .592, IFI = .615, TLI = .561, CFI = .613, GFI = .470, AGFI = .329, RMSEA = .214. Lastly, we used the marker-variable technique (Lindell and Whitney 2001; Malhotra et al. 2006) by adding a theoretically unrelated variable of *uncertainty avoidance* as a marker variable. Under the marker-variable approach, correlations between uncertainty avoidance and the other five research constructs are assumed to have no relationship. The results suggested that CMB was not a significant concern because the average correlation coefficient was close to 0 ( $r = .057$ , ns). These diagnostic analyses suggest that CMB is unlikely to be an issue.



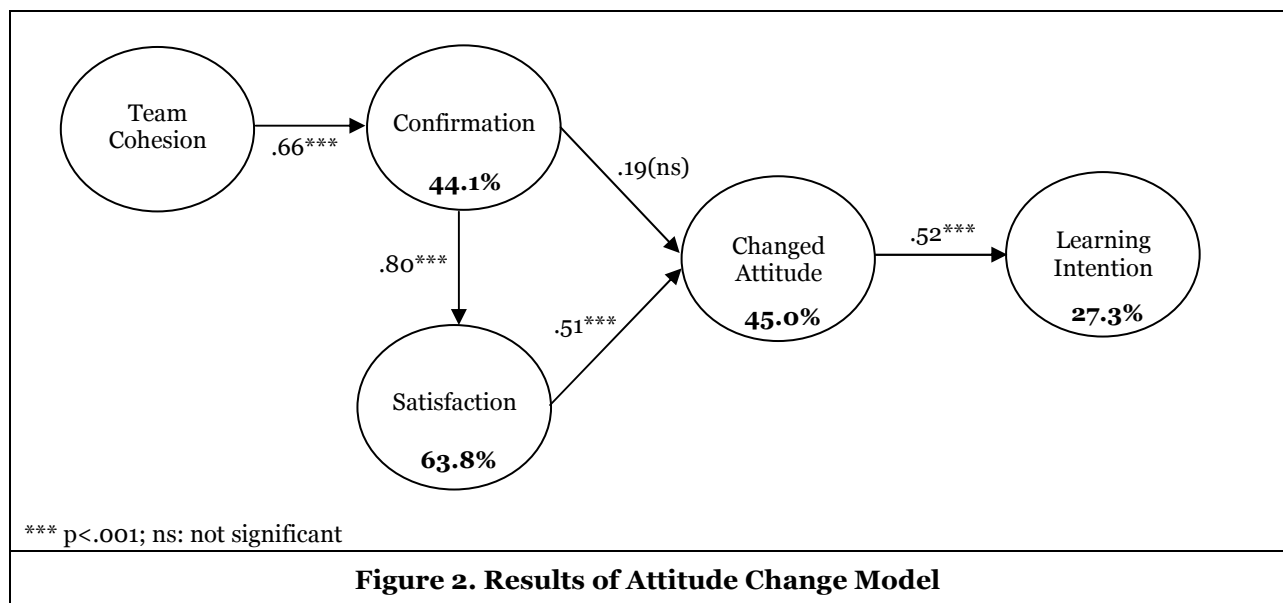
### Paired t-Test for Attitude Change

The overall results indicate that there is no significant difference between pre-attitude and post-attitude. However, there are outstanding differences when variances are examined, so we divided post-attitude into three groups: low (bottom third), medium (middle third) and high (top third). As shown in Table 6, there are significant differences between pre-attitude and post-attitude in all three groups. This confirms that the changed attitude construct can be successfully examined in the model and also highlights the importance of examining variances as well as means.

<b>Table 6. Results of Paired t-Test</b>								
	Pre-Attitude		Post-Attitude		Difference		Paired t-test	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	t	Sig
Overall (N=219)	5.32	1.18	5.24	1.51	-.08	1.45	-.806	.421
Low (N=73)	4.81	1.04	3.44	1.00	-1.37	1.16	-10.071	.000
Medium (N=83)	5.22	1.15	5.60	.40	+.38	1.19	2.906	.005
High (N=63)	6.04	1.04	6.85	.24	+.81	0.97	6.639	.000

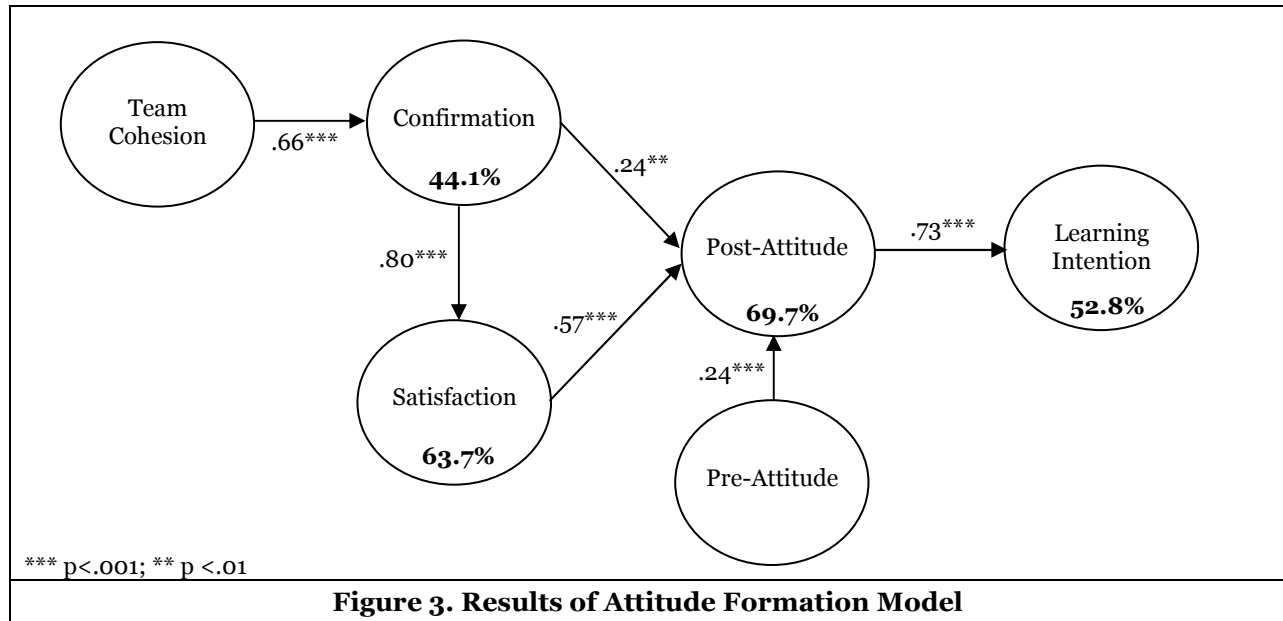
### Hypothesis Testing

A structural model was tested. Overall fit indices of the structural model were satisfactory (See table 7). All paths in this model, with one exception, were found to be significant at  $p < .05$  as shown in Figure 2. Team cohesion had a significant effect on confirmation ( $\beta = .66$ ;  $p < .001$ ) with support for H1. Team cohesion explained 44.1% of the variance in confirmation. We found significant effects of confirmation on satisfaction ( $\beta = .80$ ;  $p < .001$ ), post-attitude ( $\beta = .20$ ;  $p < .05$ ), demonstrating support for H2. However, we did not find a significant relationship between confirmation and changed attitude ( $\beta = .19$ ; ns). However, changed attitude significantly influenced learning intention ( $\beta = .52$ ;  $p < .001$ ). The variances explained were 44.1% for confirmation, 63.8% for satisfaction, 45.0% of changed attitude, and 27.3% of learning intention.



### Post Hoc Analysis: Attitude Formation Model

As previously mentioned, we conducted a post hoc analysis to examine the attitude formation model by controlling for pre-attitude. As presented in Figure 3, all relationships are significant at  $p=.01$  level. Goodness of model fit indices of measurement and structural models for two models are presented in Table 7.



**Table 7. Goodness of Model Fit Indices**

		# of Items	$\chi^2$ (df)	$\chi^2/df$	NFI	IFI	TLI	CFI	GFI	AGFI	RMSEA
Desired Level				<3.0	>.90	>.90	>.90	>.90	>.90	>.80	<.080
Attitude Change Model	Measurement Model	18	163.35 (125)	1.31	.96	.99	.99	.99	.93	.90	.038
	Structural Model	18	262.85 (130)	2.02	.93	.96	.96	.96	.89	.86	.068
Attitude Formation Model	Measurement Model	21	236.33 (174)	1.36	.95	.99	.98	.99	.91	.88	.041
	Structural Model	21	311.86 (182)	1.71	.93	.97	.97	.97	.88	.85	.057

## Discussion and Conclusion

Discussion of key findings along with the implications, limitations, and future research directions are presented in the following section.

### Discussions of Key Findings

Overall, our results provide empirical support for all hypotheses, except H3. The perceived cohesion scales developed by Chin et al. (1999) is a significant antecedent of confirmation, and it explained 44.1% of variance in confirmation. This suggests that team members who perceive strong belonging and morale to their teams help the members confirm what they expected before the simulation game.

While the relationship between confirmation and post-attitude was significant in the attitude formation model, the relationship between confirmation and changed attitude was not significant. One explanation for the nonsignificant result is that confirmation (a belief) is a predictor of formed attitude, not changed attitude. In other words, less confirmation of the ERP simulation game leads to less positive levels post-attitude. However, the results of the attitude change model suggest that high (or less) confirmation does not necessarily lead to positive (or negative) attitude change.

As found in the TRA and TPB research, post-attitude when controlling for pre-attitude explained a large portion of the variance in intention (52.8%). In the attitude change model, changed attitude also explains a significant portion of the variance in intention (27.3%). This suggests that changed attitude also is an important predictor of intention.

### ***Implications for Research***

This study makes several theoretical contributions in terms of (1) an extension of the ECT and (2) attitude change. First of all, by systematically investigating team cohesion in a team-based learning environment, we expanded the theoretical boundaries of the ECT with a focus on attitude change. Although ECT researchers have identified predictors of confirmation and satisfaction such as perceived performance (McKinney et al. 2002) and perceived usefulness (Bhattacharjee and Premkumar 2004), team cohesion has not been examined in existing ECT literature. We proposed and tested an attitude change model. We also found that the ECT can be successfully applied in identifying learners' satisfaction and attitude change.

Second, we showed the mutable nature of attitudes by presenting the attitude change model. Prior research based on TRA, TPB, TAM, and UTAUT has not emphasized attitude change. Moreover, we incorporated changed attitude in a model that has not received much attention in the IS community. Prior IS researchers have controlled pre-attitude (e.g., Angst and Agarwal 2009) like the attitude formation model in the current study. This study serves as a starting point for further research into attitude change by presenting two models which have different interpretations.

### ***Implications for Education***

The results from this study have several educational implications. First, for ERP educators, the results highlight the role of the ERP simulation game. Table 6, where attitude change is split into three categories (low, medium, and high), shows that the ERP simulation game does not always increase a learner's attitude. ERP educators could identify the aspects of the simulation game which lead to attitude change, such as perceived ease of use. For example, if learners' attitude toward the game is significantly improved, and they feel that the simulation game is easy to learn and play, then the instructors might need to identify these aspects of the simulation game to increase the usability and playfulness.

Second, this study confirms the importance of team cohesion in the educational context. For small team projects, educators need to focus on ways to help students become more cohesive, such as increasing levels of belonging and morale. For example, an educator may be able to frequently identify team members' perceived cohesion from the survey. Then, he/she can find team characteristics to effectively enhance team collaboration (e.g., sharing information and communicating ideas).

### ***Implications for Practice***

This study provides practical implications for employee training and team-based projects. Our findings suggest a significant role of simulation games in user training. When businesses employ a simulation game for user training, they should carefully consider possible negative effects (e.g., negative attitude change).

Our suggestion of focusing on team cohesion is consistent with the findings of prior research on the positive relationship between cohesion and performance. Business managers and team managers need to focus on the ways to increase team cohesion in terms of belonging and morale in order to increase the confirmation of team projects.

### ***Limitations and Future Research Directions***

This study is not without limitations. First, we used students subjects enrolled in an introductory Management Information Systems class, possibly limiting the generalizability of the results. Additional research with real ERP users in a corporate environment or student subjects with prior ERP experience who are taking advanced SAP classes could strengthen our findings. Second, the results are based on a basic distribution game, *Water Bottle Game*. Future research with advanced versions of ERP simulation games or other types of business simulation games could enhance the generalizability of the results. Third, we did not examine prior teamwork experience. Although this activity could be the first teamwork experience of some participants of this study, it is possible that prior teamwork experience could influence perceived cohesion and consequently attitude. Thus, future studies should consider the degree of experience. Issues from level of analysis are the last limitation. We did not include team outcome (i.e., performance), which is a team level measure in the model. Other attitude models, including balance theory and cognitive dissonance models, suggest that positive team performance outcomes could be associated with positive attitudes towards the team (e.g., team cohesion) and perceptions of other outcomes (e.g., learning). In addition, perceptions of team cohesion were measured on an individual basis without aggregating this information across teams. Since our model is based on the individual level of analysis, we did not include team performance and did not attempt to examine cohesion at the team level. Future research should investigate both team level of measures (e.g., team performance and cohesion) and individual level of measures (e.g., satisfaction and attitude) in one model using multilevel analysis.

### ***Concluding Remarks***

The results from this study indicate an important role in satisfaction and attitude change in team-based learning. The ECT offers a useful theoretical framework for understanding how group cohesion influences attitude change. This study can serve as a cornerstone for the future examination for ERP learning and attitude change research.

### ***Acknowledgement***

We appreciate an associate editor and two anonymous reviewers for their helpful comments. This research was supported in part by Center for Technology Innovation at University of Wisconsin-Milwaukee. All authors contributed equally to this paper.

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